CLAIMS

1. An Mg-based ferrite material having a composition of formula (1):

$$X_aMg_bFe_cCa_dO_e \quad (1)$$

wherein

X is Li, Na, K, Rb, Cs, Sr, Ba, Y, La, Ti, Zr, Hf, V, Nb, Ta, Al, Ga, Si, Ge, P, Sb, Bi or a combination thereof; and

a, b, c and d satisfy

$0.001 \leqq R(X) \leqq 0.15$

wherein

R(X) is represented by the formula:

$R(X)=a\times(Aw(X)+(n/2)\times Aw(O))/(a\times(Aw(X)+(n/2)\times Aw(O))+b\times Fw(MgO)+(c/2)\times Fw(Fe_2O_3)+d\times Fw(CaO))$;

Aw(X) and Aw(O) are an atomic weight of X and an atomic weight of O, respectively;

n is an oxidation number of X; and

Fw(A) is a formula weight of A,

$0.01 \leqq b/(b+c/2) \leqq 0.85$ and

$0 \leqq R(Ca) \leqq 0.15$

wherein

R(Ca) is represented by the formula:

$R(Ca)=d\times Fw(CaO)/(a\times(Aw(X)+(n/2)\times Aw(O))+b\times Fw(MgO)+(c/2)\times Fw(Fe_2O_3)+d\times Fw(CaO))$;

wherein

Fw(A) is the same as defined in R(X),

e is determined by the oxidation numbers of X, Mg, Fe and Ca.

2. The Mg-based ferrite material of claim 1, wherein X is Li, Na, K, Sr, Y, La, Ti, Zr, V, Al, Si, P, Bi or a combination thereof.

3. The Mg-based ferrite material of claim 1 or claim 2, wherein the Mg-based ferrite material has a dielectric breakdown voltage in the range of 1.5 - 5.0 kV.

4. The Mg-based ferrite material of any of claims 1 to 3, wherein the Mg-based ferrite material has a saturation magnetization in the range of 30 - 80 emu/g.

5. The Mg-based ferrite material of any of claims 1 to 4, wherein b and c satisfy

$$0.01 \leqq b/(b+c/2) \leqq 0.30.$$

6. The Mg-based ferrite material of any of claims 1 to 5, wherein the Mg-based ferrite material has an average particle diameter in the range of 0.01 - 150 µm.

7. An electrophotographic development carrier comprising an Mg-based ferrite material of any of claims 1 to 6.

8. An electrophotographic development carrier comprising an Mg-based ferrite material of any of claims 1 to 6, wherein the Mg-based ferrite material is coated with a resin.

9. An electrophotographic developer comprising an electrophotographic development carrier of claim 7 or claim 8, and a toner.

10. The electrophotographic developer of claim 9, wherein the ratio of the toner to the carrier by weight is in the range of 2 - 40 wt%.

11. A process for producing an Mg-based ferrite of any of claims 1 to 6, comprising steps of:

i) mixing raw materials;

ii) sintering the mixed raw materials to grow particles, wherein a maximum temperature is in the range of 800-1500 °C; and

(iii) heating the sintered raw materials under an oxygen-containing atmosphere to condition properties of the particles, wherein a maximum temperature in the range of 300-1000 °C.

12. The process for producing an Mg-based ferrite of claim 11,

wherein the oxygen concentration in the atmosphere of the step (iii) is higher than that of the step (ii).

13. The process of claim 11 or claim 12, wherein the atmosphere of the step (iii) is an inert gas atmosphere having an oxygen concentration of 0.05 to 25.0 vol%.

14. The process of any of claims 11 to 13, wherein the atmosphere of the step (ii) is an inert gas atmosphere having an oxygen concentration of 0.001 to 10.0 vol%.

15. The process of any of claims 11 to 14, wherein the step (i) of mixing raw materials comprises steps of:

preparing a slurry containing an Mg-containing compound and an Fe-containing compound; and

drying the slurry for granulation.

16. The process of claim 15, wherein the slurry containing an Mg-containing compound and an Fe-containing compound further comprises a compound containing Li, Na, K, Rb, Cs, Sr, Ba, Y, La, Ti, Zr, Hf, V, Nb, Ta, Al, Ga, Si, Ge, P, Sb, Bi, Ca or a combination thereof.

17. The process of claim 15 or claim 16,

wherein the slurry containing an Mg-containing compound and an Fe-containing compound further comprises a binder, and

wherein the content of the binder is in the range of 0.1 - 5 wt%, based on the total amount of the raw materials in the slurry.